

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Currently Amended) A semiconductor laser device which emits light at at least one oscillation wavelength, the laser device comprising a reflective film including a multilayer dielectric film, on at least one side of an optical exit face of a laser chip, wherein

the reflective film includes, adjacent and in sequence from a side in contact with the laser chip, a first dielectric film having a refractive index n_1 , a second dielectric film having a refractive index n_2 , a third dielectric film having a refractive index n_3 , and a fourth dielectric film having a refractive index n_4 ,

$n_2 = n_4 < n_1 < n_3$, and

the reflective film has a reflectance within a range of 3% to 15% at at least one of the oscillation wavelengths.

2. (Currently Amended) A semiconductor laser device which emits light at at least one oscillation wavelength, the laser device comprising a reflective film including a multilayer dielectric film, on at least one side of an optical exit face of a laser chip, wherein

the reflective film includes, adjacent and in sequence from a side in contact with the laser chip, a first dielectric film having a refractive index n_1 , a second dielectric film having a refractive index n_2 , a third dielectric film having a refractive index n_3 , and a fourth dielectric film having a refractive index n_4 ,

$n_2 = n_4 < n_3 < n_1$, and

the reflective film has a reflectance within a range of 3% to 15% at at least one of the oscillation wavelengths.

3. (Previously Presented) The semiconductor laser device according to Claim 1, wherein each of the first, second, third, and fourth dielectric films has a thickness, in terms of optical length, within $\pm 30\%$ of a thickness that is an integer multiple of $1/4$ of the at least one oscillation wavelength of the semiconductor laser device.

4. (Previously Presented) The semiconductor laser device according to Claim 2, wherein each of the first, second, third, and fourth dielectric films has a thickness, in terms of optical length, within $\pm 30\%$ of a thickness that is an integer multiple of $1/4$ of the at least one oscillation wavelength of the semiconductor laser device.

5. (Previously Presented) A semiconductor laser device which emits light at at least one oscillation wavelength, λ , comprising:

a reflective film including a multilayer dielectric film, on at least one side of optical exit faces of a laser chip, wherein

the reflective film has a reflectance of 3% to 15% and includes, in sequence from a side in contact with the laser chip, a first dielectric film of a refractive index n_1 and a thickness d_1 , a second dielectric film of a refractive index n_2 and a thickness d_2 , a third dielectric film of a refractive index n_3 and a thickness d_3 , and a fourth dielectric film of a refractive index n_4 and a thickness d_4 ,

the refractive index n_1 satisfies $1.6 < n_1 \leq 1.9$, the refractive index n_2 satisfies $1.3 \leq n_2 \leq 1.6$, the refractive index n_3 satisfies $1.9 < n_3 \leq 2.3$, and the refractive index n_4 satisfies $1.3 \leq n_4 \leq 1.6$, and

the thickness d_1 is substantially equal to $(2 \cdot h + 1)\lambda / (4 \cdot n_1)$, the thickness d_2 is substantially equal to $(2 \cdot i + 1)\lambda / (4 \cdot n_2)$, the thickness d_3 is substantially equal to $(2 \cdot j + 1)\lambda / (4 \cdot n_3)$, and the thickness d_4 is substantially equal to $(2 \cdot k + 1)\lambda / (4 \cdot n_4)$, and each of h , i , j , and k is zero or a positive integer.

6. (Previously Presented) A semiconductor laser device which emits light at at least one oscillation wavelength λ , the laser device comprising:

a reflective film including a multilayer dielectric film, on at least one side of optical exit faces of a laser chip, wherein

the reflective film has a reflectance of 3% to 15% and includes, in sequence from a side in contact with the laser chip, a first dielectric film of a refractive index n_1 and a thickness d_1 , a second dielectric film of a refractive index n_2 and a thickness d_2 , a third dielectric film of a refractive index n_3 and a thickness d_3 , and a fourth dielectric film of a refractive index n_4 and a thickness d_4 ,

the refractive index n_1 satisfies $1.9 < n_1 \leq 2.3$, the refractive index n_2 satisfies $1.3 \leq n_2 \leq 1.6$, the refractive index n_3 satisfies $1.6 < n_3 \leq 1.9$, and the refractive index n_4 satisfies $1.3 \leq n_4 \leq 1.6$, and

the thickness d_1 is substantially equal to $(2 \cdot h + 1)\lambda / (4 \cdot n_1)$, the thickness d_2 is substantially equal to $(2 \cdot i + 1)\lambda / (4 \cdot n_2)$, the thickness d_3 is substantially equal to $(2 \cdot j + 1)\lambda / (4 \cdot n_3)$, and the thickness d_4 is substantially equal to $(2 \cdot k + 1)\lambda / (4 \cdot n_4)$, each of h , i , j , and k is zero or a positive integer.

7. (Previously Presented) The semiconductor laser device according to Claim 1, wherein the first dielectric film is selected from the group consisting of Al_2O_3 , CeF_3 , NdF_3 , MgO , and Y_2O_3 , the second and fourth dielectric films are selected from the group consisting of SiO_2 , MgF_2 , BaF_2 , and CaF_2 , and the third dielectric film is selected from the group consisting of Ta_2O_5 , SiO , ZrO_2 , ZnO , TiO , TiO_2 , ZnS , Nb_2O_5 , HfO_2 , and AlN .

8. (Previously Presented) The semiconductor laser device according to Claim 5, wherein the first dielectric film is selected from the group consisting of Al_2O_3 , CeF_3 , NdF_3 , MgO , and Y_2O_3 , the second and fourth dielectric films are selected from the group consisting of SiO_2 , MgF_2 , BaF_2 , and CaF_2 , and the third dielectric film is selected from the group consisting of Ta_2O_5 , SiO , ZrO_2 , ZnO , TiO , TiO_2 , ZnS , Nb_2O_5 , HfO_2 , and AlN .

9. (Previously Presented) The semiconductor laser device according to Claim 2, wherein the first dielectric film is selected from the group consisting of Ta_2O_5 , SiO , ZrO_2 ,

ZnO, TiO, TiO₂, ZnS, Nb₂O₅, HfO₂, and AlN, the second and fourth dielectric films are selected from the group consisting of SiO₂, MgF₂, BaF₂, and CaF₂, and the third dielectric film is selected from the group consisting of Al₂O₃, CeF₃, NdF₃, MgO, and Y₂O₃.

10. (Previously Presented) The semiconductor laser device according to Claim 6, wherein the first dielectric film is selected from the group consisting of Ta₂O₅, SiO, ZrO₂, ZnO, TiO, TiO₂, ZnS, Nb₂O₅, HfO₂, and AlN, the second and fourth dielectric films are selected from the group consisting of SiO₂, MgF₂, BaF₂, and CaF₂, and the third dielectric film is selected from the group consisting of Al₂O₃, CeF₃, NdF₃, MgO, and Y₂O₃.

11. (Previously Presented) The semiconductor laser device according to Claim 1, including a fifth dielectric film and a sixth dielectric film on a first region of the reflective film, but not on a second region of the reflective film, and reflectance of the first region is smaller than reflectance of the second region.

12. (Previously Presented) The semiconductor laser device according to Claim 2, including a fifth dielectric film and a sixth dielectric film on a first region of the reflective film, but not on a second region of the reflective film, and reflectance of the first region is smaller than reflectance of the second region.

13. (Previously Presented) The semiconductor laser device according to Claim 11, wherein each of the fifth and sixth dielectric films has a thickness, in terms of optical length, within $\pm 30\%$ of range of an integral multiple of $1/4$ of the oscillation wavelength of the semiconductor laser device.

14. (Previously Presented) The semiconductor laser device according to Claim 12, wherein each of the fifth and sixth dielectric films has a thickness, in terms of optical length, within $\pm 30\%$ of range of an integral multiple of $1/4$ of the oscillation wavelength of the semiconductor laser device.

15. (Previously Presented) The semiconductor laser device according to Claim 13, wherein the fifth dielectric film is selected from the group consisting of Al_2O_3 , CeF_3 , NdF_3 , MgO , and Y_2O_3 , and the sixth dielectric film is selected from the group consisting of SiO_2 , MgF_2 , BaF_2 , and CaF_2 .

16. (Previously Presented) The semiconductor laser device according to Claim 14, wherein the fifth dielectric film is selected from the group consisting of Al_2O_3 , CeF_3 , NdF_3 , MgO , and Y_2O_3 , and the sixth dielectric film is selected from the group consisting of SiO_2 , MgF_2 , BaF_2 , and CaF_2 .

Claims 17-20 (Cancelled).

21. (Previously Presented) A semiconductor laser device according to Claim 1, wherein the first dielectric film is in contact with the optical exit face.

22. (Previously Presented) A semiconductor laser device according to Claim 2, wherein the first dielectric film is in contact with the optical exit face.